A Brief Updated Examination on the Enigma of Hyperlexia

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Abstract

This short paper attempts to provide an updated brief examination of hyperlexia covering on its changing definition, prevalence, signs and symptoms as well as the currently available strategies to help children with hyperlexia. The author has also incorporated the Triple-D model of teaching and the CCAS framework to help paint a clearer picture for educators to navigate through the planning that will support the holistic development of the child with hyperlexia. Consequently, the educator can envision what can be done to help the child see the light at the end of the tunnel and the journey together with the child to see the light can be a fulfilling one.

Key words: CCAS framework, hyperlexia, Triple-D model of teaching

Introduction

According to the American Speech-Language-Hearing Association (ASHA), hyperlexia is a developmental disorder in which children exhibit precocious printed language decoding abilities with deficits in reading comprehension. It is categorized as autism spectrum disorder (ASD), but has a differential diagnosis as it has been reported among children with developmental disorder other than ASD (ASHA, 2006). Similarly, in the Educator’s Diagnostic Manual of Disabilities and Disorders (EDM), a description of hyperlexia is provided for the Individualized Education Program (IEP) under the Individuals with Disabilities Education Act of 2004 (IDEA 2004) classification of autism at Level 1. Hyperlexia is the specific disorder identified at Level 2 (Pierangelo & Giuliani, 2007).

Generally, the term hyperlexia refers to developmental hyperlexia in children. Non-developmental hyperlexia on the other hand refers to an acquired rendition of hyperlexia such as in the case found by researchers of a 69-year-old woman who had suffered cerebral infarction and in other cases of people suffering from brain dysfunction or lesion (Suzuki, Itoh, Hayashi, Kouno, & Takeda, 2009).

Prevalence of Hyperlexia

The incidence of developmental hyperlexia has been estimated to be between 5% and 20% (Grigorenko et al., 2002). For children with autism, the frequency of its co-occurrence is between 5% and 10% (Burd & Kerbeshian, 1985). In most learning disorders, there is a higher rate of incidence in boys as compared to girls for disorders related to the left or right
brain. However, there is no evidence of significant gender differences in the occurrence of hyperlexia (Grigorenko, et al., 2002).

According to medical research (Semrud-Clikeman & Hynd, 1990), the left hemisphere of the brain is more language based, while the right, more visual-spatial. There is more asymmetry between the two hemispheres of the male brain as the maturation rates are different from the female brain. This asymmetry usually explains why more boys are affected by learning disorders which however, is not the case for hyperlexia.

**Symptoms of Hyperlexia**

The comprehension impairment in hyperlexia inevitably contributes to neurobehavioral symptoms of social deficits. These deficits range from a severe lack of social involvement (autistic-like) to milder features of social aloofness, even though these children do have positive social–emotional attachment with significant others (Pennington, 1991), i.e. parents and other close relatives or friends. Often, loved ones may ignore and dismiss their social aloofness and inability to initiate conversations as shyness and find it to be of unnecessary concern. Their perspective may be to let their children pursue their own interests and preference since they appear to be more intelligent than other children in recognizing print. However, the inability to put themselves in the shoes of others due to their comprehension impairment may lead to these children being misunderstood as being insensitive, disrespectful or even cruel by their abnormal response to social situations.

Another symptom of hyperlexia is the compulsion to decode print stimuli without comprehension of its meaning (Whitehouse & Harris, 1984). Hence the precocious reading ability is even likened to barking at print and marked by echolalia. The intense and preoccupying interest in print stimuli replaces other developmentally appropriate activities for these children (Healy, 1982). This lack of exposure to other developmentally appropriate activities can compound their inability to comprehend social relationships which typically developing children have. Healy (1982) also reported that parents have sought specialist help before age 5 because they suspected cognitive impairments, language delay, and behavioural abnormalities in their children. Also, they were surprised that their children could read before being able to talk by pointing to words and objects to demonstrate understanding. In one case, the child would ignore the multitude of toys which surrounded him and lie down in his playpen to study his books instead. These parents are the ones who realize that ignorance is not bliss after all, if the child remains locked up in an isolated world of their own.

Children’s talent in word recognition can be suggestive of an advanced development in a specific brain function generating the advantage in learning. However, hyperlexia is more often termed as an unusual ability in children with learning disorders, especially in language (Aaron, 1989). This unusual ability is sometimes termed as a splinter skill or savant idiosyncrasy (Treffert, 2011). In the article *Hyperlexia: Disability or superability?*, the researchers Grigorenko, Klin, and Volkmar (2003) examined the debate on whether hyperlexia is a distinct syndrome with comorbidities, given that it exists with a number of different disorders, or if it is a part of the spectrum of some other disorders. They concluded with a rejection of the latter definition, rendering hyperlexia the status of a distinct syndrome.

Literature on precocious ability in word recognition can be found as far back as 1919, in a work by Parker. It is called *Pseudo-talent for words*, likely due to the phenomenal word recognition talent with impaired comprehension occurring in developmentally disabled
populations. Other early researchers (Kanner, 1943; Phillips, 1930) also found it in their clinical populations of childhood schizophrenias and autistic disorders. Eventually, Silberberg and Silberberg (1967) called it hyperlexia to refer to an unusually well-developed ability to read single words in children with cognitive deficits and behavioural abnormalities.

However, a year after this term was coined, Niensted (1968) argued that typically developing children without cognitive impairments can also be hyperlexic, as in having a large discrepancy between the high-level of decoding and low-level of comprehending printed words. Subsequently, various other researchers also reported on such cases (e.g., Jackson, Donaldson, & Cleland, 1988; Pennington, Johnson, & Welsh, 1987; Richman & Kitchell, 1981). The talent can be so remarkable as in the case of a toddler (2-11 years) who could read almost seven years beyond his IQ or language age and was developmentally normal with no signs of autism or related disorders (Pennington, et al., 1987).

In the study by Niensted (1968) which found typically developing school children with hyperlexia, it was noted that the possibility of a physiological (familial) variant cannot be overruled. Two groups of such children from the regular school population were given remediation (less than 60 minutes a week and not longer than 8 months) with emphasis upon comprehension and phonics. The post-tests found that only one remained hyperlexic in one of the groups. Nevertheless, the remaining hyperlexic child had increased her comprehension by one year within three months of the intervention. These results suggest that hyperlexia can be overcome through educational therapy.

In order to distinguish hyperlexia from precocious reading skills in children without developmental delays, Healy (1982) argued that the diagnosis of hyperlexia should require a co-occurrence of interpersonal difficulties. The precocious ability in word recognition is nevertheless the significant descriptor which is defined as a spontaneous ability to read words before age 5. In her studies, Healy (1982) found that children with hyperlexia were unable to pass age-appropriate Piagetian tasks, both verbal and non-verbal. While they might comprehend literal units, their comprehension broke down when abstract or organizational strategies were required to gain meaning. The prognosis is that such a phenomenal word-calling ability may or may not continue to develop although word recognition skills remain well above our expectations based on other cognitive or linguistic abilities.

Various researchers (e.g., Huttenlocher & Huttenlocher, 1973; Mehegan, Fritz, & Dreifuss, 1972; Burd, Fisher, Knowlton, & Kerbeshian, 1987; Treffert, 2011) concur that the prognosis for hyperlexia is better than one without the phenomenal reading ability as reading is a tool for acquiring knowledge. For the children with atypical development, researchers (Huttenlocher & Huttenlocher, 1973; Mehegan, Fritz, & Dreifuss, 1972) have reported a better lifelong outcome for them as compared to those without hyperlexia. A few studies (Burd, Fisher, Knowlton, & Kerbeshian, 1987; Burd, Kerbeshian, & Fisher, 1985) even reported markedly increased IQs for their samples of children with pervasive developmental disorders (PDD) and hyperlexia. According to Treffert (2011), the neurotypical group with their advanced reading at a very early age inevitably draws attention. Eventually their classmates catch up in reading skills, but these children, usually very bright, go on to have very typical, successful lives. He also noted that the autistic-like abnormalities in hyperlexia can be remediated through occupational and behaviour therapy.

The work cut out for educators would then be in early intervention for the cognitive deficits observed in forming, linking, or comprehending the meaning of symbols, and/or failures of
differentiation. Being unable to distinguish symbols from the thing being symbolized, fantasy from reality, and self from other, exemplifies concrete thinking, which is an extraordinarily difficult condition to treat (Tuch, 2011). Therefore, parents who assume that their children’s hyperlexia can be dismissed as a passing phase in childhood do not realize that they are far from being correct. Often, the assumption is that these children would eventually comprehend the meaning in the same way they easily figured out how to read the print.

Such an assumption ignores the basis that word recognition is a decoding process which those with hyperlexia are very good at, while comprehension is a much more complex process requiring organizational skills that are absent in hyperlexia. This can be more easily perceived by comparing the behavioural effects of hyperlexia with that of dyslexia. The comprehension problem in dyslexia is a secondary one due to difficulties in recognizing the written word (Pennington et al., 1987). Hence, dyslexics can perform normatively in listening comprehension but not in reading comprehension. On the other hand, school-going children with hyperlexia will perform way below the norm in both listening and reading comprehension, rendering the comprehension problem to be a primary one.

Described under the theoretical concept of a reading disability, hyperlexia is on the polar opposite of dyslexia (Aaron, 1989; Gough & Tunmer, 1986). The model in Figure 1 illustrates this theory through the role of decoding in reading, where reading is the product of decoding and comprehension. Three types of reading disabilities are shown: an inability to decode (dyslexia), an inability to comprehend (hyperlexia), and a mixture of both (non-specific reading disability or NSRD in short). In dyslexia, the inability to decode is coupled with good comprehension while in hyperlexia, the reverse pattern is manifested. In this way, hyperlexia is seen as a disorder of good word recognition with poor comprehension.

According to Chia (1995), there are three levels of reading comprehension: word, sentence and text levels. Hence, remediation for poor comprehension can be targeted at each level through various organizational strategies. For those struggling in mainstream schools, the difficulty would likely be at the sentence and text level if they be able to understand the meaning of isolated words. At these two levels, remediation for the cognitive impairment can be explored within the context of the cognitive load theory. In this theory, comprehension may be difficult if the text consists of many elements that must be kept in working memory at the same time. By organizing some elements into schemas such as providing a diagram, the cognitive load may be reduced, allowing the material to be understood more easily (Marcus, Cooper, & Sweller, 1996).
Intervention Strategies for Hyperlexia

Indeed, various interventions using organizational supports have been found to increase the saliency of linguistic relationships for poor-comprehenders (e.g., Åsberg & Sandberg, 2010; Clarke, Snowling, Truelove, & Hulme, 2010; Idol-Maestas, 1985; Yuill & Joscelyne, 1988). The findings in these intervention studies support the premise that poor-comprehenders do not have the instinctive organizational ability that good-comprehenders have. This was shown in the effectiveness of the organizational support for the first but not the latter who find it redundant as they instinctively see the linguistic relationships and organize the text mentally. The effectiveness of these interventions shows that support is warranted for the absence of organizational skills in poor-comprehenders. It also serves to encourage other researchers to further on their research to fill in the gaps that can make interventions ever more user-friendly and effective.

The difficulties with "Wh" questions (Deevy & Leonard, 2004; Goodwin, Fein, & Naigles, 2012; Hundert & van Delft, 2009; Schulz & Roeper, 2011) that poor-comprehenders have is such a gap. "Wh" questions are who, what, when, where, and why questions. The underlying organization of any text in relation to these interrogatives may be unrecognizable to poor-comprehenders, but it can be externalized with written support in the Scaffolding Interrogatives Method (SIM) (Chia, 2002). This method uses a matrix (a concrete resource) which can be self-generated through training. Clues to the interrogatives who/what/where/when of each sentence in a text are written in their respective columns, and further scaffolding for the clues is done with the What Interrogatives Method (WIM) (Chia, 2002). The WIM structures clues by using “what time” for when, “what place for where,” and “what person” for who. In this way, it can pre-empt poor comprehenders’ deficiency in knowing what to search from the text, and their dependency on teacher support. In a study by Hundert and van Delft (2009), it was found that poor-comprehenders are least efficient in learning the organizational pattern with verbal guidance. The SIM matrix would therefore provide a better support by leveraging on their preference with written support which replaces the verbal “Wh” questions from the teacher in the two-step correction procedure from the study which teachers typically use.

A single-subject study on the SIM intervention had found improved scores for the subject during the treatment (Chia, 2002). The effectiveness thus renders the intervention an evidence-based practice. Its use in a natural classroom environment has the advantage of freeing the teacher from being tied down to providing continual assistance, and more importantly, allowing the subject to become more independent. Where test-taking is concerned, without the availability of teacher assistance, this strategy of generating a matrix independently would come in handy to work out answers. Of note, this written support can function as programmed instruction – a form of assistive technology (Blackhurst, 2005).

It is thus hoped that the SIM will serve to make mainstream inclusion of children with hyperlexia more viable through its validated utility. That said, educators must keep in mind the various sensitivities that might impede the child’s performance in comprehension and remove other stimuli or reduce their effects as much as possible by providing the conducive environment, extra time and instructions which the child had missed out on. This is in effect keeping in mind, as educators, that the work cut out cannot be managed simply with the model of a reading disability.
Given that hyperlexia is a syndrome, interventions should be carried out with the awareness of the other difficulties which can co-exist with it. Much disappointment and misunderstanding can be avoided in this way, making the educator’s job a more pleasant one. For example, the social imperceptions in autism may be behind the student’s abrupt mannerisms and failure to execute social niceties such as saying “hello”, “thank you” and “good-bye” which a neuro-typical person normally expects. Rather than to make cultural judgments on what the student fails to do, it is better to look on the positive aspects, such as the inability of persons with autism to execute deception or diplomacy that often hinders others from seeing the truth.

A more holistic way of managing hyperlexia and facilitating the development of the IEP for the student is to use the Triple-D model (see Figure 2). There are three phases in this framework: Diagnostics, Dialogics, and Didactics (Chia & Kee, 2012a).

**Diagnostics**

This is the first phase whereby the educator evaluates and profiles the learner suspected of having hyperlexia. To do this, the reading disability symptom of hyperlexia can be operationalized by an unexpected reading precocity as compared to IQ, while reading comprehension is not unexpectedly deficient (Welsh, Pennington, & Rogers, 1987). In other words, the advanced word recognition skills is relative to the mental age but the reading comprehension corresponds only with the level of mental functioning (Glosser, Friedman, & Roeltgen, 1996). Hence, to identify students with hyperlexia, the following criterion can be used:

1. Reading age (R.A.) higher than expected based on mental age (M.A.).
2. Reading comprehension age (R.C.A.) lower than expected based on reading age (R.A.).

Some standardized tests for measuring word recognition and comprehension are: Schonell Graded Reading Test (Schonell & Schonell, 1950), St Lucia Graded Word Reading Test (Andrews, 1973), GAP reading comprehension test (McLeod, 1977) and Warncke Informal Comprehension Assessment (Warncke & Shipman, 1984).

A trans-disciplinary approach may be required in formal diagnostic tests with other professionals for suspected coexisting issues in autism or other developmental disorders. In this way, the diagnostic profile of the student would include more than just poor comprehension, but a validation by other professionals of the other issues inherent to the developmental disorder. For instance, the child may have sensory issues with respect to exteroceptive senses of hearing, seeing, touching, tasting and/or smelling, as well as
interoceptive senses of balance and motion of body (vestibular sense), and position of body (proprioception) (Chia & Kee, 2012a, 2012b).

With this knowledge of the child’s sensory difficulties, the educator can design a more appropriate action plan to help the child and better accommodate the child’s needs. Parents should be advised to obtain a more comprehensive assessment from a clinical psychologist/therapist.

**Dialogics**

This is the second phase in planning. The purpose of dialogics is to further the understanding and agreement on the strengths and needs of the child through communication with key persons involved. The educator can meet with the parents, teachers, the child’s peers and even the child himself/herself to uncover the learning and behavioral issues of the child. If the child is old enough, he/she can be informed of his/her condition to come to an agreement and understanding of it. This might make the child more aware of himself/herself and take ownership of his/her own learning and behavior. With the sharing and agreement, there can be synergy in collaboration to help the child in the next phase of didactics.

Figure 3 shows a framework (Chia & Wong, 2011) for communication and agreement in this phase. In this framework, there are three areas (cognitive, conative and affective levels) in which the learning and behavioral issues of the child can be discussed upon.

![Figure 3. Framework for Understanding Students with Learning & Behavioral Issues](image)

At the behavioral level, cognition is seen in cognitive behavior which refers to thinking; affect, affective behavior which refers to feeling; and conation, conative behavior which refers to actions (Poland, 1974). The cognitive behavioral level of a child can be seen in the answers given by the child. When for instance, a child is asked “Where is your pencil?” and the answer is incoherent, it shows that the child may not be cognizant of the question. In the game “I spy with my little eye”, children display cognitive behavior by giving their answers to clues such as “something that is used for writing”. The cognitive impairment in hyperlexia is usually shown in conceptual and sequential deficits. Following the triangulation of information with key persons in dialogics about cognitive issues, greater attention and support is warranted. Key persons interacting and educating the child must be engaged to help the child level up instead of leaving the child to cope with his/her own limited abilities. This is in essence, leaving no child behind.
As for affective and conative behaviors, dialogics can involve questions about the child’s sensory issues, such as the contexts which may trigger hyper-sensitivity or hypo-sensitivity. Conative behavior can be seen in the child’s internalizing or externalizing behaviors in response to sensory stimuli. Much as therapy can help the child recognize and keep these behaviors under control, the educator needs to be aware of the threshold at which the child will start “stimming”, have a meltdown or go out of control. To avoid these situations that impede both the child’s ability to learn and the educator’s ability to teach, the undesired stimuli must be removed or kept to a minimum. As children have different background experiences, it may take some time for an educator to be able to pre-empt what may become an undesirable situation but the privy sharing in dialogics with key persons can make this happen more quickly. By learning from the parents, siblings, peers, therapists and psychologists, previous interventions (successes or failures) can be further built upon to avoid the pitfalls.

**Didactics**

In this phase, information from the diagnostics and the dialogics is used to design an appropriate action plan to help the child with hyperlexia. The plan would include details on the content to be taught, the teaching aids that can be used, the teaching methods (e.g. the SIM), the media used, and the teaching environment that will be conducive for the learner. This is in practice, setting up the resources and supports needed for the learner to achieve one’s teaching objectives. Some examples of in-class supports would include assigning a buddy to the special-needs child, seating the child close to the teacher for the teacher to keep the child on-task and removing or reducing the effects of stimuli that may adversely affect the child’s ability to learn.

It should be noted that the educator may not always foresee changes in circumstances as the interaction within the class is a dynamic one. For instance, the child may have a meltdown due to some contention with a classmate, or the teacher may lack the time to teach the child to apply strategies (such as the SIM) independently. Therefore, short term objectives may change, but the long term goal can still be achieved through lesson study and remediation. Reflecting on efforts to improve teaching is an essential element purported in Lesson Study which originated in Japan (Fernandez, 2002). This can be done with a mentor, a supervisor or a team who share a common interest.

Didactics should also include engaging the people within the learning environment of the special-needs child, such as the classmates, who can in turn benefit from the values of inclusion and embracing differences. The sooner the typically developing peers learn to accommodate special-needs students within the school context, the more acquiescent the society would be towards special-needs when they all grow up. To put this into context, the modified framework for Assessment, Planning, Implementation and evaluation (APIE) (Chia & Kee, 2012a, 2012b) can be used. Figure 4 illustrates this modified framework based on the human development framework of a societal ecosystem (Bronfenbrenner, 1986; Bronfenbrenner & Hamilton, 1978). It shows that student, peer, teacher, curriculum and resource, and environment factors all play into the child’s performance in the modified societal ecosystem. Therefore, it is imperative these factors play a positive part and avoid offsetting the contributions that collaborative efforts can bring to the achievement of long-term goals.
In conclusion, the knowledge of frameworks, models and interventions can help paint a clearer picture for educators to navigate through the planning that will support the holistic development of the child with hyperlexia. Consequently, the educator can envision what can be done to help the child see the light at the end of the tunnel and the journey together with the child to see the light can be a fulfilling one.

References


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